

obvious that if the mixtures on the two sides of the plug were left a long time they would eventually come to the same composition. Therefore in applying the principle of separation by diffusion to natural conditions it is necessary to assume an irreversible flow of gas, such as one that might be caused by some sudden relief of pressure, and that during the course of such a flow the pores gradually become sealed up again so that re-mixing of the gases thus separated is impossible. The localization of gas and oil pools in lenticular sands shows that remarkable differences in pressure and composition are thus preserved for long periods.

The results given above have suggested several further subjects for study which will be taken up as fast as possible. Among these are (1) The behavior of other fine-pored materials, such as shale, slate, and sandstone; (2) the effect of the thickness of the plug; (3) measurements of other gases, including helium and certain light hydrocarbons; (4) adaptation to commercial separations; (5) possible application in the separation of isotopes.

Several papers have been published on the theory of separating gases by diffusion,⁸ but the question whether the composition of the porous material modifies the process by adsorption or otherwise seems to have been studied in only one experiment, in which a copper ferrocyanide membrane was used, as described by Lorenz and Magnus.

Summary.—Measurements of the separation of hydrogen from carbon dioxide obtained by fractional diffusion through ball clay were made to illustrate a process by means of which natural gas may become enriched in helium in the earth. The bearing of this theory on other theories of the origin of such gas is discussed. The rate of diffusion of several other gases through ball clay was also measured and several problems are mentioned for further study.

BOTANY.—*New Piperaceae from Central America and Mexico.*¹
WILLIAM TRELEASE, University of Illinois. (Communicated by
PAUL C. STANDLEY.)

On the following pages there are described new species and varieties of the genera *Piper* and *Peperomia*, recognized in collections submitted for study by the Field Museum of Natural History. Most of the plants named as new were obtained on the north coast and in the

⁸ MULLIKEN and HARKINS. Journ. Amer. Chem. Soc. **44**: 37. 1922. LORENZ and MAGNUS. Zeit. anorg. allgem. Chem. **136**: 97. 1924.

¹ Received July 26, 1929.

interior of Honduras by Paul C. Standley during the winter of 1927–28. The large number of new forms found in the collection need not occasion surprise if it be remembered that almost no botanical exploration had been conducted previously in Honduras.

***Peperomia granulosa* Trelease, sp. nov.**

A repent-pendulous, glabrous, moderately large, arboricolous herb; leaves alternate, lanceolate, acuminate, acute-based, 2.5×6 or the lower 3.5×8 cm., pinnately veined, opaque, granular especially beneath; petiole 7–10 or 15 mm. long; spikes terminal, as yet 1×35 mm., the stalk 3 cm. long, bibracteate in the middle; bracts round-peltate.

HONDURAS: Lancetilla Valley near Tela, Dept. Atlántida, altitude about 100 m., January 11, 1928, *Paul C. Standley* 54360 (Herb. Field Mus. No. 583, 593, type). Also No. 56566 from the same locality.

Leaves pale green, fleshy; spikes green or pale green.

***Peperomia staminea* Trelease, sp. nov.**

A somewhat caespitose, moderate-sized herb, glabrous except for the puberulent petioles, peduncles, and nodes; stem rather slender (2 mm. thick), drying sulcate-angular; leaves 2–4 at a node, elliptic, obtusely somewhat contracted, acute-based, $1-1.5 \times 2-2.5$ cm., drying green-papery, 3-nerved beneath; petiole 2–3 mm. long; spikes terminal, 2×30 mm., closely flowered; peduncle long (3.5 cm.); bracts round-peltate; stamens oblong.

HONDURAS: On tree in wet forest, Lancetilla Valley near Tela, Dept. Atlántida, altitude about 100 m., January 16, 1928, *Paul C. Standley* 54614 (Herb. Field Mus. No. 583, 590, type).

Leaves very thick; spikes bright green; stems reddish.

***Piper achoteanum* Trelease, sp. nov.**

A nodose shrub 2–3 m. tall; flowering internodes short and stout, crisp-pubescent or hirsute, closely pale-granular when denuded; leaves broadly lanceolate, acute, somewhat unequally cordulate, $4.5-5 \times 11$ cm., pinnately nerved from below the middle, the nerves about $5 + 6$, transiently short-pubescent above, becoming granular and lepidote-roughened, hispid beneath with subappressed-hirsute nerves; petiole about 5 mm. long, glabrescent; spikes opposite the leaves, $3-4 \times 55$ mm., pointed; peduncle 8 mm. long, ascending-hirtellous; bracts round-subpeltate, rusty, ciliolate; flowers sessile, perfect.

HONDURAS: In wet thicket in pine forest, El Achote near Siguatepeque, Dept. Comayagua, alt. 1,500 m., February 18, 1928, *Paul C. Standley* 56125 (Herb. Field Mus. No. 581, 879, type).

***Piper aeruginosibaccum* Trelease, sp. nov.**

A shrub 2 m. tall, nodose; flowering internodes rather thick and short, crisp-hirsute-subvillous with white hairs but glabrescent except below the petioles; leaves elliptic, short-acuminate, slightly inequilaterally more or less cordulate, rather large ($6-7 \times 14-16$ cm.), submultiple-nerved from below the upper third, the nerves about 5×2 with the lowest approximate, glossy green, paler and glandular-granular beneath with the prominent pale nerves

and cross-veins spreading-hirsute; petiole 5 + 2 mm. long, hirsute; spikes opposite the leaves, 4 × 70 mm., mucronate, rusty; peduncle 5 mm. long, glabrous; bracts subtriangular-subpeltate; flowers sessile, perfect; berries rather large, subglobose with sunken apex, rusty-puberulent; stigmas 2-3, sessile.

HONDURAS: Moist thicket, near La Ceiba, Dept. Atlántida, at sea level, March 11, 1928, *Paul C. Standley* 56735 (Herb. Field Mus. No. 581,616, type).

Spikes pale green; leaves lustrous on the upper surface.

***Piper alveolatifolium* Trelease, sp. nov.**

A shrub 3 m. tall; upper internodes rather slender but short, pale-hispid; leaves broadly lanceolate, gradually and obtusely attenuate, subequilaterally shallow-cordate or cordulate, 7.5-8.5 × 20-22 cm., pinnately nerved from the lower half, the nerves 4-5 × 2, somewhat bullulate, granular-scabrous above, paler green beneath with the very prominent nerves and veins spreading-soft-hairy; petiole 10-15 mm. long, hispid, winged nearly to the blade; inflorescence unknown.

HONDURAS: In thicket along stream, near Siguatepeque, Dept. Comayagua, alt. 1,080-1,400 m., February, 1928, *Paul C. Standley* 56344 (Herb. Field Mus. No. 581,751, type).

PIPER ANGUSTIAE Trelease, var *quiotepcanum*, var. nov.

A much-branched shrub, at most barely puberulent on the young parts; flowering internodes slender and short; leaves round-ovate or ovate, acute to somewhat acuminate, the broad base slightly cordulate, 2.5 × 3.5 or 3.5-4 × 6 cm., drying dull dark green and firm, 5-nerved; petiole 5-10 mm. long; spikes opposite the leaves, 2 × 40 mm., closely flowered; peduncle slender, 5-7 mm. long; bracts concave-subpeltate, dorsally ciliate; berries oblong-ovoid, contracted at apex, glabrous; stigmas 3, large, brown, and sessile.

MEXICO: Pueblo de Quiotepec, Cuicatlán, Oaxaca, alt. 500 m., *H. and C. Conzatti and T. C. Gómez* 2383 (Herb. Field Mus. No. 246,911, type).

***Piper aspericaule* Trelease, sp. nov.**

A shrub 2.5 m. tall, nodose; flowering internodes drying yellowish, persistently hispid and rough; leaves lance- or ovate-subelliptic, sharp-acuminate, obliquely and often very inequilaterally rounded at the base, 5.5-7 × 12-14 cm., pinnately nerved from the lower half, the nerves about 4 + 5, caducously hairy and later granular-roughened above with hispid nerves, the nerves beneath ascending-hirsute; petiole about 10 mm. long, hispid-hirsute, not winged; spikes opposite the leaves, some 3 × 80 mm., cream-colored; peduncle 5 mm. long, scabrid; bracts inconspicuous, rounded-subpeltate, ciliolate.

HONDURAS: In wooded swamp near Tela, Dept. Atlántida, at sea level, January 27, 1928, *Paul C. Standley* 55125 (Herb. Field Mus. No. 583,270, type).

"Cordoncillo." Spikes cream-colored.

***Piper atlantidanum* Trelease, sp. nov.**

A shrub 2 m. tall; flowering internodes moderate, soft-hairy; leaves obliquely subquadrate-ovate, slightly short-acuminate, cordulate with one

side distinctly shorter, $9 \times 15-11 \times 20$ or 13×25 cm., pinnately nerved from the lower half, the nerves about $5 + 6$, somewhat rugulose, softly crisp-pubescent on both sides but slightly granular above, paler beneath; petiole some $15 + 5$ mm. long, soft-hairy, winged toward the base; spikes opposite the leaves, 3×70 mm., blunt; peduncle 5 mm. long, crisp-hirtellous; bracts triangular-subpeltate, ciliate; berries trigonous, truncate, brown, glabrous; stigmas 3, minute, sessile.

HONDURAS: In moist thicket, near La Ceiba, Dept. Atlántida, at sea level, March 11, 1928, *Paul C. Standley* 56739 (Herb. Field Mus. No. 581,620, type). Tela, Atlántida, at sea level, *Standley* 56600. Lancetilla Valley, near Tela, in wet thicket, *Standley* 54938. La Fragua, Atlántida, alt. 20 m., *Standley* 55736.

Spikes green or pale green.

PIPER ATLANTIDANUM Trelease, var. *yoroense*, var. nov.

Leaves becoming relatively narrower (10×22 cm.) and then not cordulate.

HONDURAS: Wet thicket near Progreso, Dept. Yoro, alt. 30 m., January 24, 1928, *Paul C. Standley* 55073 (Herb. Field Mus. No. 583,981, type).

A shrub 2 m. high; spikes pale green.

Piper atrichopus Trelease, sp. nov.

A bushy, nodose, quite glabrous shrub 2-3 m. tall; flowering internodes slender and short; leaves lanceolate, subfalcately long-attenuate, subequilaterally acute-based, $3-3.5 \times 12-14$ cm., pinnately nerved nearly throughout, the nerves some 10×2 , but with 2 or 4 from very near the base, long-ascending, green, chartaceous, narrowly revolute; petiole 5 mm. long, not winged; spikes opposite the leaves, 2×40 mm.; peduncle 5 mm. long; bracts small, rounded-subpeltate; berries globose; stigmas 3, minute, sessile.

HONDURAS: Wet forest, Lancetilla Valley near Tela, Dept. Atlántida, altitude 150 m., January 16, 1928, *Paul C. Standley* 54594 (Herb. Field Mus. No. 583,633, type). Also Nos. 52616, 52871, 53290, 56757, from the same region.

"Cordoncillo." Leaves often lustrous; spikes green or pale green.

Piper caliendriferum Trelease, sp. nov.

A somewhat nodose shrub; flowering internodes moderately slender and short, sparsely crisp-pubescent, darkening; leaves lance-ovate, acuminate, inequilaterally rounded at base or slightly cordulate, $4 \times 9-5 \times 10-13$ cm., pinnately nerved from the lower half, the nerves 5×2 , sparsely hirtellous toward the base above and more abundantly on the nerves beneath; petiole $15 + 2$ mm. long, hirtellous, sheathing to the middle; spikes $5 \times 60-80$ mm., mucronate; peduncle 15 mm. long, from sparingly hirtellous to glabrescent; bracts subtriangular, subpeltate, large, long-ciliate; berries subglobose, glabrous; stigmas 3, linear, connate into a very short style.

MEXICO: Cerro de la Raya, Cuyamecalco, Oaxaca, alt. 2,800 m., *H. and C. Conzatti and T. C. Gómez* 2384 (Herb. Field Mus. No. 246,912, type).

Piper chichankanabanum Trelease, sp. nov.

A shrub (?), glabrous, nodose; leaves lance-oblong, acuminate, the little narrowed, acute base slightly inequilaterally unguiculate, $3.5 \times 11-4.5 \times 14$

cm., 5- or 7-nerved, thin but becoming slightly bullate in age; petiole scarcely 5 mm. long; inflorescence unknown.

MEXICO: Chichankanab, Yucatan, *G. F. Gaumer* 23699 (Herb. Field Mus. No. 466,121, type).

PIPER COBANENSE Trelease, var. **sarculatum**, var. nov.

A suffrutescent weed 1-1.5 m. tall; flowering internodes slender and elongate, crisp-pubescent; leaves broadly ovate or round-ovate, acuminate, rounded at base or openly cordate, $12 \times 15-16$ cm., 9-nerved, the nerves hirtellous above and crisp-hirtellous beneath; petiole slender, variable (2-4 cm.) in length, crisp-pubescent, not winged; inflorescence unknown.

HONDURAS: In banana plantation, Quebrada Seca, Dept. Yoro, alt. 30 m., December, 1927, *Paul C. Standley* 53912 (Herb. Field Mus. No. 584,243, type).

Piper cordoncillo Trelease, sp. nov.

Flowering internodes rather slender and short, sparingly crisp-pubescent; leaves ovate, sometimes with nearly straight sides, blunt-acuminate, sometimes mucronulate, rounded or subtruncate at the base or abruptly deltoidly contracted into the petiole, moderately small ($5-7$ or $9 \times 11-14$ cm.), palmately 5-nerved, pubescent beneath and sparingly on the nerves above; petiole short (5-10 or 15 mm.), not winged, villous; spikes opposite the leaves, slender and moderately long ($3-4 \times 90$ mm.); peduncle slender, short (about 5 mm.), hairy; rachis foveolate, glabrate; bracts subpeltate, rusty-ciliate; flowers sessile, perfect; stigmas 3-4, sessile, large; berries small, conical-ovoid, puberulent.

MEXICO: Mayito, Tabasco, in 1889, *J. Roviro* 423 (U. S. Nat. Herb. No. 798,394, type).

PIPER CORDONCILLO Trelease, var. **apazoteanum**, var nov.

Leaves more regularly ovate, the larger subpalmately nerved; leaves and stem much more densely pubescent.

MEXICO: Apazote, Campeche, *E. A. Goldman* 475 (U. S. Nat. Herb. No. 396,837, type).

Piper dedititium Trelease, sp. nov.

A shrub 2.5 m. tall; flowering internodes short and moderately stout, at most evanescently puberulent, becoming somewhat granular; leaves lance- or elliptic-oblong, acuminate, inequilaterally subacute at base, $5-6 \times 12-14$ cm., pinnately nerved from below the upper third, the nerves 4×2 , rather glossy with the nerves velvety-puberulent beneath; petiole glabrous, about $10 + 3$ mm. long, not winged; spikes opposite the leaves, $3-4 \times 80-100$ mm.; peduncle scarcely 10 mm. long, glabrous; bracts transversely subpeltate, ciliolate; flowers sessile, perfect; berries glabrous, brown, oblong, terete or slightly elongate with the rachis, concavely subtruncate; stigmas 3, small, sessile.

HONDURAS: Wet thicket, Quebrada Seca, Dept. Yoro, alt. 30 m., December, 1927, *Paul C. Standley* 53937 (Herb. Field Mus. No. 583,916, type).

Leaves dark green; spikes pale green.

***Piper fallens* Trelease, sp. nov.**

A shrub 2.5 m. tall, dark-villous throughout; flowering internodes rather slender and short; leaves elliptic or lance-elliptic, sharp-acuminate, inequilaterally cordulate, 7-8 × 17-18 cm., pinnately nerved from below the middle, the nerves some 3 + 4; petiole about 3 + 2 mm. long; spikes opposite the leaves, 3 × 50 mm.; peduncle 10-15 mm. long; bracts triangular-subpeltate, the back white-fimbriate; berries rather large, papillate, truncate; stigmas 2, slender, on a short style.

HONDURAS: Wet forest, Lancetilla Valley near Tela, Dept. Atlántida, alt. 500 m., December 31, 1927, *Paul C. Standley* 53968 (Herb. Field Mus. No. 583,884, type). Also No. 56820, from the same region.

***Piper fraguanum* Trelease, sp. nov.**

A shrub 2.5 m. tall; flowering internodes moderate, scabro-hispid becoming concolorously finely granular; leaves broadly elliptic, rather abruptly acuminate, nearly equilaterally rounded at base, 9-10 × 18-20 cm., pinnately nerved from the lower half, the nerves about 5 × 2, granular and lepidote above, scabrid beneath with upcurved-white-hispid nerves; petiole about 15 mm. long, hispid; spikes opposite the leaves, as yet young and small.

HONDURAS: Wet flat forest, La Fragua, Dept. Atlántida, alt. 20 m., February 7, 1928, *Paul C. Standley* 55730 (Herb. Field Mus. No. 581,536, type).

***Piper Gaumeri* Trelease, sp. nov.**

A shrub 5 m. high, glabrous; flowering internodes moderately slender and short; leaves broadly elliptic, abruptly blunt-acuminate, mucronulate, abruptly subacute at the base, palmately 5-nerved or obscurely 7-nerved, small (5 × 8 cm.); petiole short (5 mm.); spikes opposite the leaves, slender but moderately long (3 or in fruit 4 by as much as 70 mm.); peduncle slender, short (10 mm.) but surpassing the petiole; bracts concave; flowers sessile, perfect; stigmas 3, sessile; berries distinct, small, oblong-ovoid.

MEXICO: Buena Vista Xbac, Yucatan, *G. F. Gaumer* 783 (U. S. Nat. Herb. No. 571,779, type).

***Piper hispidiseptum* Trelease, sp. nov.**

A shrub 2-3 m. tall; flowering internodes moderate, scabro-hispid; leaves elliptic or subobovate-elliptic, more or less falcately acuminate, cordulate with one side shorter, 8 × 17-11 × 23 cm., pinnately nerved from the lower half, the nerves about 6 × 2, white-granular-scabrid and with hispid midrib above, the lower surface rather softly pubescent with stiffly hairy nerves; petiole some 15 + 5 mm. long, hispid; spikes opposite the leaves, 4 × 80 mm.; peduncle 15 mm. long, hispid; bracts roundish-subpeltate, ciliolate.

HONDURAS: Wet thicket, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., December 8, 1927, *Paul C. Standley* 52715 (Herb. Field Mus. No. 582,300, type). Also No. 55660 from the same locality.

"Cordoncillo." Spikes pale green.

***Piper imperspicuibracteum* Trelease, sp. nov.**

A shrub 2-3 m. tall; flowering internodes rather slender and short, crisp-hirsute; leaves lanceolate, very gradually sharp-acuminate, inequilateral at base with the longer side rather rounded, 4-5 × 10-13 cm., pinnately nerved

from the lower half, the nerves about 4 + 5, granular-scabrous above, dark-punctulate beneath, with the nerves subappressed-hispid; petiole about 15 + 2 mm. long, upcurved-hirsute like the base of the midrib; spikes some 3 × 90–100 mm., straight; peduncle 5 mm. long, somewhat hirtellous; bracts rounded-subpeltate, rather dingy-margined.

HONDURAS: Wet thicket, near Tela, Dept. Atlántida, at sea level, January 19, 1928, *Paul C. Standley* 54770 (Herb. Field Mus. No. 583,364, type). Also No. 56602, from the same locality.

Leaves dark green; spikes pale green.

***Piper indignum* Trelease, sp. nov.**

A compact nodose rusty-pubescent shrub 2 m. tall; flowering internodes rather stout and short, matted-hirsute; leaves ovate or lance-ovate, acute rather than acuminate, slightly inequilaterally obtuse at base, 4.5 × 9–5.5 × 10.5 or 7 × 13 cm., pinnately nerved from below the middle, the nerves 5 or 6 × 2, becoming rugulose, softly appressed-pubescent above and densely crisp-pubescent beneath; petiole 10–15 mm. long, soft-hairy; spikes opposite the leaves, as yet young and very small.

HONDURAS: Moist thicket, near Siguatepeque, Dept. Comayagua, alt. 1,100 m., February, 1928, *Paul C. Standley* 55990 (Herb. Field Mus. No. 582,044, type).

***Piper lancetillanum* Trelease, sp. nov.**

A shrub 2–3 m. tall; flowering internodes moderately slender and elongate, hirsute; leaves subelliptic, acuminate, unequally somewhat cordulate, 7 × 16–10 × 22 cm., pinnately nerved from the lower half, the nerves about 6 × 2, sparsely short-hairy above, later granular and lepidote, appressed-hirsute beneath, especially on the nerves; petiole 10 or 15 + 2 or 3 mm. long, hispid-hirsute; spikes opposite the leaves, some 3 × 60 mm.; peduncle 5 mm. long, hispid; bracts rounded-subpeltate, ciliolate.

HONDURAS: Moist thicket, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., March 5, 1928, *Paul C. Standley* 56552 (Herb. Field Mus. No. 581,978, type). Also No. 53231, from the same locality.

“Cordoncillo.” Spikes pale green.

***Piper laterifissum* Trelease, sp. nov.**

A shrub 2–4.5 m. tall; flowering internodes rather stout and elongate, crisp-pubescent; leaves elliptic-subovate, subobtuse, cordate with lateral sinus, the rounded longer lobe much surpassing the petiole, 25 × 50 cm., subpinnately nerved below the upper fourth, the nerves 5 or 6 × 2, crisp-hairy beneath; petiole 4 cm. long, somewhat fleshy-warty or corky and crisp-pubescent, winged to the end; inflorescence unknown.

HONDURAS: Wet forest, Lancetilla Valley near Tela, Dept. Atlántida, alt. 300 m., December 31, 1927, *Paul C. Standley* 53943 (Herb. Field Mus. No. 584,143, type). Also, from the same locality, Nos. 55408, 54151, 53136.

***Piper levilimum* Trelease, sp. nov.**

A shrub 2–4 m. tall; flowering internodes rather slender and elongate, at most locally and evanescently slightly soft-hairy, somewhat pale-granular; leaves ovate, acuminate, equilaterally rounded or subtruncate at base or with

the base deltoid-acute or broadly cuneate, 7×14 – 14×17 or 12×20 cm., multiple-veined from the lower third or half, the nerves 3 (or obscurely 4) \times 2, papery, submarginally ciliate beneath; petiole 2–5 cm. long, transiently pilose, winged at the base or on the more truncate-based leaves nearly to the blade; spikes opposite the leaves, 4×105 mm.; peduncle 10 mm. long, quickly glabrate; bracts rounded-subpeltate, ciliolate; flowers perfect, sessile; berries subtriquetrously obovoid, truncate; stigmas 3, minute, sessile.

HONDURAS: Wet forest, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., December 22, 1927, *Paul C. Standley* 53483 (Herb. Field Mus. No. 583,185, type). Also No. 55263, from the same locality. Triunfo, near Tela, in wet thicket, *Standley* 53839.

“Cordoneillo.” Leaves dark-green; spikes green.

Piper micoense Trelease, sp. nov.

A shrub (?), nodose; flowering internodes moderately stout and short, crisply fine-hirsute, granular when subglabrescent; leaves lanceolate or subelliptic-lanceolate, sharply attenuate, inequilaterally cordulate, 3×9 – 5×12 cm., pinnately nerved from the lower half, the nerves some $5 + 6$, rugose, silky-hirsute on both sides but becoming scabrous above from the bases of the fallen hairs; petiole some $5 + 3$ mm. long, hirsute; spikes opposite the leaves, 3×80 mm.; peduncle slender, 5–8 mm. long, hirsute; bracts rounded-subpeltate, ciliate; flowers sessile, perfect; berries small, subcylindric, papillate; stigmas 3, sessile.

GUATEMALA: Sierra del Mico, between Los Amates and Izabal, *W. A. Kellerman* 6715 (Herb. Field Mus. No. 221,055, type).

Piper nonconformans Trelease, sp. nov.

A shrub 2 m. tall, nodose, of the aspect of *P. lanceaefolium*; flowering internodes short and relatively thick, densely yellow-hirsute; leaves lance-oblong, gradually sharp-acuminate, obtuse at base or semicordulate, 4 – 5×14 – 16 cm., pinnately nerved from below the middle, the nerves about 5×2 , subrugose, finely pubescent above but quickly glabrescent and very rough-granular, lepidote, silky beneath and granular between the salient nerves and cross-veins; petiole about 5 mm. long, subhirsute, not winged; spikes opposite the leaves, somewhat curved, pale, as yet 2×50 mm.; peduncle scarcely 10 mm. long, subhirsute; bracts roundish-subpeltate, downy-ciliate; flowers sessile.

HONDURAS: In pine forest near Siguatepeque, Dept. Comayagua, alt. 1,100 m., February 1928, *Paul C. Standley* 55906 (Herb. Field Mus. No. 581,168, type).

Piper obsessum Trelease, sp. nov.

A shrub 2 m. high; flowering internodes slender and elongate, hispid-hirsute; leaves inequilaterally subovate, acuminate, the narrowed base rounded on the longer side, 6.5 – 7.5×13 – 16 cm., pinnately nerved from the lower half, the nerves about 6×5 , thin, rather glossy, transiently short-pubescent becoming granular-roughened, somewhat subcrisp-pubescent beneath with upcurved-hirsute nerves; petiole $13 + 2$ mm. long, upcurved-hirsute; spikes opposite the leaves, 3×50 mm.; peduncle 8 mm. long, scabro-hispid; bracts rounded-subpeltate, ciliolate.

HONDURAS: Wet thicket, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., January 22, 1928, *Paul C. Standley* 54925 (Herb. Field Mus. No. 584,233, type).

Spikes dull pale green.

***Piper onerosum* Trelease, sp. nov.**

A shrub 2-3 m. tall, scarcely nodose; flowering internodes rather slender and moderately short, pale green, crisp-hirsute, finely papillate when glabrescent; leaves lance-elliptic, sharp-acuminate, inequilaterally cordulate, 7-10 × 16-18 cm., pinnately nerved from the lower half, the nerves 4 or 5 × 2, glossy dark green above, paler and crisp-pubescent beneath with hirsute nerves, the lower surface finally scabrid; petiole some 5 + 2 mm. long, hirsute, winged at base; spikes opposite the leaves, 3-4 × 55 mm., mucronate; peduncle 5-7 mm. long, hirtellous; bracts lunulate-subpeltate, ciliate; flowers sessile, perfect; berries globose, rusty-puberulent; stigmas 3, small, sessile in a depression.

HONDURAS: Edge of wooded swamp near Tela, Dept. Atlántida, at sea level, December 27, 1927 *Paul C. Standley* 53696 (Herb. Field Mus. No. 582,949, type). Also No. 56621, from the same locality. Near Progreso, Dept. Yoro, in wet thicket, alt. 30 m., *Standley* 55022. Lancetilla Valley near Tela, alt. 100 m., in wet thicket, *Standley* 52682.

"Cordoncillo." Stems pale green; leaves dark green; young spikes cream-colored, the older ones pale green.

***Piper perspicuibracteum* Trelease, sp. nov.**

A shrub 2 m. tall; flowering internodes slender and moderately elongate, crisp-hirsute, granular-roughened; leaves lanceolate, gradually sharp-acuminate, inequilaterally rounded at base, 6 × 15 cm., pinnately nerved from the lower half with oblique cross-veins, the nerves about 4 + 5, granular-scabrous above and somewhat lepidote, dark-punctulate beneath with the nerves subappressed-hispid; petiole about 15 + 2 mm. long, upcurved-hirsute like the base of the midrib; spikes 3 × 120 mm., at first curved; peduncle 10 mm. long, granular; bracts round-subpeltate, with rather large, pale margin.

HONDURAS: Wet thicket, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., January 21, 1928, *Paul C. Standley* 54872 (Herb. Field Mus. No. 584,074, type).

"Cordoncillo." Spikes pale green.

***Piper praeterlatum* Trelease, sp. nov.**

A shrub 2-3 m. tall, with the general characters of *P. aeruginosibaccum*, but the leaves lanceolate, falcately rather long-acuminate, somewhat crisp-pubescent beneath, and 6 × 15-8 × 20 cm.

HONDURAS: Wet forest, Lancetilla Valley, near Tela, Dept. Atlántida, alt. 100 m., January 11, 1928, *Paul C. Standley* 54337 (Herb. Field Mus. No. 583,571, type).

"Cordoncillo." Spikes pale green.

***Piper prodigum* Trelease, sp. nov.**

A shrub 2 m. tall, rather nodose; flowering internodes moderate, somewhat hispid, finely granular when denuded; leaves lance-elliptic or becoming

broadly oblanceolate, sharp-acuminate, inequilaterally cordulate, 7-8 × 20 cm., pinnately nerved from the lower half, the nerves about 5 + 6, white-granular becoming lepidote above, the nerves upcurved-hispid-hirsute beneath; petiole about 10+2 mm. long, hispid; spikes opposite the leaves, 3 × 80 mm.; peduncle 10 mm. long, short-hispid; bracts rounded-subpeltate, ciliolate.

HONDURAS: Wet thicket, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., January 22, 1928, *Paul C. Standley* 54916 (Herb. Field Mus. No. 583,750, type).

"Cordoncillo." Spikes pale green.

Piper scabrisseptum Trelease, sp. nov.

A shrub 2-3 m. tall, somewhat zigzag; flowering internodes moderately short and slender, matted-scabro-hispid, obscurely granular; leaves broadly elliptic or subovate, acuminate, inequilaterally slightly cordulate, 8-9 × 15-17 cm., pinnately nerved from the lower half, the nerves about 5 + 6, granular and lepidote with granular-roughened midrib above, the nerves beneath spreading hispid-hirsute; petiole 5 + 3 mm. long, hispid; spikes opposite the leaves, 3 × 60 mm.; peduncle 6 mm. long, short-hispid; bracts inconspicuous, rounded-subpeltate, ciliolate.

HONDURAS: Wet thicket, Lancetilla Valley near Tela, Dept. Atlántida, alt. 100 m., December 8, 1927, *Paul C. Standley* 52681 (Herb. Field Mus. No. 582,776, type).

"Cordoncillo." Spikes greenish white.

Piper speratum Trelease, sp. nov.

A shrub 2.5 m. tall; flowering internodes rather short and slender, drying angular, retrosely scabro-hispid; leaves obliquely elliptic, sharp-acuminate, rounded at base on the fuller side, 9-10 × 17-19 cm., pinnately nerved from the lower half, the nerves about 5 × 2, short-pubescent above becoming granular-roughened, scabrid beneath with upcurved-hispid nerves; petiole about 10 + 2 mm. long, hispid; spikes opposite the leaves, 3 × 90 mm.; peduncle 5 mm. long, scabro-hispid; bracts rounded-subpeltate, white-ciliolate.

HONDURAS: Wooded swamp, Tela, Dept. Atlántida, at sea level, January 27, 1928, *Paul C. Standley* 55184 (Herb. Field Mus. No. 583,272, type).

Spikes dull green or cream-colored.

Piper vexans Trelease, sp. nov.

A shrub 2.5 m. tall, slightly nodose; flowering internodes rather slender and short, hirsute, becoming glabrate and finely granular; leaves lanceolate, falcately sharp-acuminate, inequilaterally more or less cordulate, 5-6 × 14-16 cm., pinnately nerved from about the lower half, the nerves 4 or 5 × 2, glossy dark green above, crisp-pubescent and finally scabrid beneath; petiole some 5 + 2 mm. long, staring-hirsute, winged at base; spikes opposite the leaves, as yet 2 × 20 mm., scarcely mucronate, on short hirtellous peduncles; bracts subpeltate; flowers sessile, perfect.

HONDURAS: Wet thicket near Tela, Dept. Atlántida, at sea level, January 18, 1928, *Paul C. Standley* 54742 (Herb. Field Mus. No. 583,715, type).

• *Piper yoroanum* Trelease, sp. nov.

A shrub 2 m. tall; flowering internodes moderate, crisp-subhirsute, pale-granular when denuded; leaves elliptic-subobovate, sharp-acuminate, the narrowed base inequilaterally rounded, 7-9 × 15-18 cm., pinnately nerved from the lower half, the nerves 5 or 6 × 2, minutely scabrid becoming granular and lepidote above with hispid nerves, the nerves beneath appressed-hirsute and the surface scabrid; petiole 5 + 5 to 15 + 5 mm. long, hispid; spikes opposite the leaves, as yet 3 × 50 mm.; peduncle 5 mm. long, hispid; bracts rounded-subpeltate, ciliolate.

HONDURAS: In wet thicket, Quebrada Seca, Dept. Yoro, alt. 30 m., December, 1927, *Paul C. Standley* 53889 (Herb. Field Mus. No. 583,866, type).

Spikes pale green.

ZOOLOGY.—*The development and generic position of Sagrina (?) tessellata* H. B. Brady.¹ JOSEPH A. CUSHMAN, Sharon, Massachusetts.

Brady described *Sagrina (?) tessellata* in the *Challenger Report* (Zoology 9: 585. *pl. 76, f. 17-19*. 1884), from two or three specimens from Nares Harbor, Admiralty Islands, 17 fathoms, and from Raine Island, Torres Strait, 155 fathoms. His original description reads as follows:

Test cylindrical, arcuate, slightly tapering; composed of a few (four or five) elongate, oval or subcylindrical segments, each a good deal larger than its predecessor, joined end to end. Surface areolated; the areae, which are of elongate, hexagonal form, disposed in regular, alternating, transverse lines. Aperture a central rounded orifice, with or without a sessile lip. Length 1/45th inch (0.57 mm.).

Other records for this species are given by Howchin from the Tertiary of Australia (Trans. Roy. Soc. So. Australia 12: 11. *pl. 1, f. 7*. 1889), by Millett from the Malay Archipelago (Journ. Roy. Micr. Soc. 1903: 273. *pl. 5, f. 16*), by Schubert from the Pliocene of the Bismarck Archipelago, a single 4-chambered specimen (Abhandl. k. k. geol. Reichs. 20 (4): 89. 1911), and by Heron-Allen and Earland from the Kerimba Archipelago off southeastern Africa (Trans. Zool. Soc. London 20: 677. *pl. 51, f. 9*. 1915). These authors note that they "have records of it from many shallow gatherings in the Malay and Eastern Seas."

With this species is another, evidently closely related, named by Brady *Sagrina limbata* and studied farther by Millett, who found that the chambers are divided into chamberlets. He notes: "The division of the chambers by transverse septa is not a character of the genus *Sagrina*, and further researches will probably render it necessary

¹ Received July 11, 1929.